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ABSTRACT

This paper outlines a model identification procedure for vocational educators to use in determining new and emerging occupations. Reviewed first are major available works dealing with identifying and planning for new and emerging occupations. Detailed discussions are provided of the various components of the model. The first phase of the model to be discussed is that of monitoring factors that generate new occupations. Set forth next are guidelines for obtaining advisory committee input. The next phase of the assessment and planning process examined is that of developing and implementing strategies for vocational educators to use in establishing and maintaining a working relationship with business and industry. Outlined next are data collection and data analysis procedures for use in designing and utilizing graduate and employer followup studies. After a discussion of the role of literature reviews in the assessment of new and emerging occupations, guidelines are presented for determining whether given programs are needed, for writing job descriptions, and for incorporating data from the assessment procedure into the regular curriculum development procedure. (MN)

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# IDENTIFICATION PROCEDURES

# FOR

# NEW AND EMERGING OCCUPATIONS

# FOR

# VOCATIONAL EDUCATION

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## INTRODUCTION

The ability to readily identify new and emerging occupations for which demand may suddenly arise is becoming increasingly important to vocational educators. With declining enrollments and budgetary restraints becoming more prevalent, vocational educators will be under more pressure to offer programs which are cost effective and occupationally relevant. Moreover, during the last decade, technological advancements have been so rapid that it is becoming necessary to identify potential new and emerging occupations well before demand actually exists. This would enable vocational educators to start preparing for the occupation so that commitment of resources is timed with increasingly clear and reliable information that job openings will exist.

Dr. James E. Seitz has pointed out,

> "Too frequently, planners develop and implement programs on the basis of personal preference. Some perform in a manner similar to the faculty member whose penchant for his "pet" subject eventually leads to another offering. It is probably a rare catalog which contains none of such programs and courses--the broader needs of institution, constituency, and clientele often being ignored or relegated to second-order importance.
>
> Other planners seem to proceed on the premise that what was good before or elsewhere is good at this point in time and place. That the situation will warrant the same kinds of programs may or may not be true.
>
> Still others have their imagination and fancy captured by faddism. The more unique, unusual, and seemingly innovative a program is the more desirable it seems to be. . . . And what could be more unjust than to lead an individual through an intensive program of study which inherently promises occupational proficiency when there is no real occupation or related employment to be had upon its conclusion?"

## LEGISLATIVE REFERENCE

"Title I: VOCATIONAL EDUCATION

Part A: State Vocational Educational Programs "General Application"

Sec. 106: (a) Any state desiring to receive the amount for which it is eligible for any fiscal year pursuant to this Act shall, through its State board, submit to, and maintain on file with, the Commissioner a general application providing assurances--

(5) (A) that the State shall, in considering the approval of (such) applications, give priority to those applications which--

(ii) propose programs which are new to the area to be served and which are designed to meet new and emerging manpower needs and job opportunities in the area and, where relevant, in the State and the Nation.

Sec. 123: Energy Education Funds...may be used (to fund) programs related to applications of solar energy.

Sec. 131: (a) Research: Funds available to the States may be used for...program improvements involving--(3)... new curriculum materials for new and emerging job fields, ...(4) projects in the development of new careers and occupations, such as--

(A) research and experimental projects designed to identify new careers in such fields as mental and physical health, crime prevention and correction, welfare, education, municipal services, child care, and recreation, requiring less training than professional positions.

Sec. 133: Curriculum Development Funds...may be used for... (1) the development and dissemination of vocational education curriculum materials for new and changing occupational fields..."

## LITERATURE REVIEW

The earliest recognized publication devoted to the subject is the 1976 "Identifying and Planning for New and Emerging Occupations: A Suggested Guide" done by the Contract Research Corporation for the U.S. Office of Education.

Paulette Meleen was the lead author. The guide documents the development and application of a process for identifying new and emerging occupations based on the following definition:

> "A new and emerging occupation is one:
> --which has come into existence in the past ten years in skilled and technical areas,
> --for which there is: an established demand (2000 + annual openings nationally), a basis for projecting growth, and a shortage of trained labor,
> --for which no public vocational training is available, and
> --which requires a minimum of two months for upgrading, six months for a new trainee, and a maximum of two years' preparation."

In his 1977 Technical Education Yearbook article, "A Decision-Making Technique for Program Planners", James E. Seitz recommends the use of a factor inter-comparison matrix and defines nine "need criterions" that should be considered. They are:

| | |
|---|---|
| Net job openings, local | Opportunities for disadvantaged |
| Net job openings, general | Level of training required |
| Occupational employment trend | Adequacy of training available |
| Wage/satisfaction incentive | Breadth of training needed |
| Advancement opportunities | |

Seitz weighs each of the factors as part of a method for establishing priorities among competing program recommendations.

Orville Nelson's 1978 Wisconsin Vocational Educator article, "Emerging Occupations" is a general discussion of the development pattern of emerging occupations. He points out that:

> "There is no ready-made process for determining when the content of an existing job should be modified to satisfy the new need or when a new job should be created. For instance, the emergence of solar heating has added several new tasks to the occupations relating to heating and air conditioning. However, many of the skills required to install solar heating systems will be essentially the same as those in present jobs in the field. Therefore, many labor researchers are suggesting adding additional content to existing occupational training programs in the heating, air conditioning and ventilation areas which will suffice to satisfy the need for new vocational skills. In contrast, the people who conduct energy audits will play a role which has not been common ir our labor market. As a result, the energy auditor would probably be best defined as a new occupation."

Renewed attention to changing skill requirements within existing occupations is apparent in the 1979 National Center for Research in Vocational Education publication, "Curriculum Development Needs for Vocational Education: New and Changing Occupational Areas," authored by Pascal Forgione and Lee Kopp. In their view, new and changing occupational areas are those characterized by:

1. high employment growth on a national level
2. emergence over the last decade; and
3. development arising from:
   a) the creastion of a new industry, occupational area or occupation (for example the computer industry with related new occupations such as programmer);
   b) significant restructuring of an existing occupational area or occupation (for example, physician's assistant; or
   c) modification in some requirements in an existing occupational area or occupation (for example, word processing).

The changes that bring about new occupations include:

1. development of new technologies, such as laser technology;
2. changes in social concerns, such as the emphasis on environmental protection;
3. changes in national needs, such as the need for alternative sources of energy;
4. development of new market opportunities, such as those for disco dance instructor, and
5. emergence of economic conditions which motivate industry to streamline operations for increased efficiency, such as cost containment efforts in the health industry.

Forgione and Kopp also point out that collecting relevant national data was difficult for several reasons:

> "First, substantive data on new and changing occupational areas simply did not exist. Second, the occupations were not uniformly defined across employers. Third, the employment data on new and changing occupations were included within existing occupations. And fourth, the collection of data directly from employers was hindered by proprietary concerns and by employers' lack of adequate knowledge about future demand."

Perhaps the most systematic project on the subject was done by Conserva, Inc. for the Illinois State Board of Education. Sally Soetz was the lead author. The final project report, "Current and Future Employment Opportunities in New and Emerging Occupations within Illinois" was published January 1980. In the project new and emerging occupations were defined as "occupations which meet the following four criteria:

1. The occupation has come into existence within the past decade.
2. The occupation is skilled or technical in nature, requiring at least six months of vocational education preparation, but less than a four-year college program.
3. There are no or limited vocational education programs within Illinois which are preparing students to enter the occupation.
4. Information is currently available which reflects an anticipated shortage of workers (20 openings per year or more) within the State of Illinois over the next five years."

The National Center for Research in Vocational Education's 1980 publication "Curriculum Development Needs for Vocational Education: New and Changing Occupations," authored by Mollie Orth and Jill Russell, contains an elaborate discussion of the process of identifying and studying new and changing occupations. To identify potential new and changing occupations, 1) technological trends, 2) social and economic trends, 3) legislative trends, 4) occupational and industrial projections, 5) related studies, and 6) external nominations are considered (Step I). In studying the potential new and changing occupations so identified, the following types of data are collected (Step II):

A. Job description and duties
    1. Alternative job titles
    2. Job descriptions
    3. Job duties
    4. Wages and hours
    5. Barriers and constraints

B. Education and training requirements
   1. Degree or certificate program
   2. Apprenticeship program
   3. On-the-job training
   4. Professional standards

C. Employment outlook
   1. Expansion
   2. Replacement
   3. Future projections
   4. Geographic factors

D. Employment settings
   1. Industry
   2. Product or service
   3. Size of typical employer
   4. Usual recruitment and hiring practices

E. Career opportunities
   1. Present source of workers
   2. Career ladder possibilities
   3. Transferable skill area

F. Agencies and individuals knowledgeable about the occupation
   1. Professional associations
   2. Renowned experts
   3. Government agencies
   4. Colleges and universities
   5. Employers

Although there is mention of the need to "move back and forth between Steps I and II of the methodology", there appears to be no explanation of how the Step II information is to be applied. Four new and changing occupations are discussed in some detail. Two dynamic industrial areas, energy and micro-processing, are also discussed.

## SUMMARY

In general, projects on new and changing occupations have concentrated on curriculum development aspects rather than establishing criteria for evidence of need.

More time has been spent developing lists of glamourous sounding new occupational titles and in developing wishful curricula than in establishing a sound basis for prioritizing proposals or developing the criteria necessary to verify that a particular occupation is indeed new, or changing, or even significant enough to warrant action.

## WAYS OF IDENTIFYING NEW AND EMERGING OCCUPATIONS

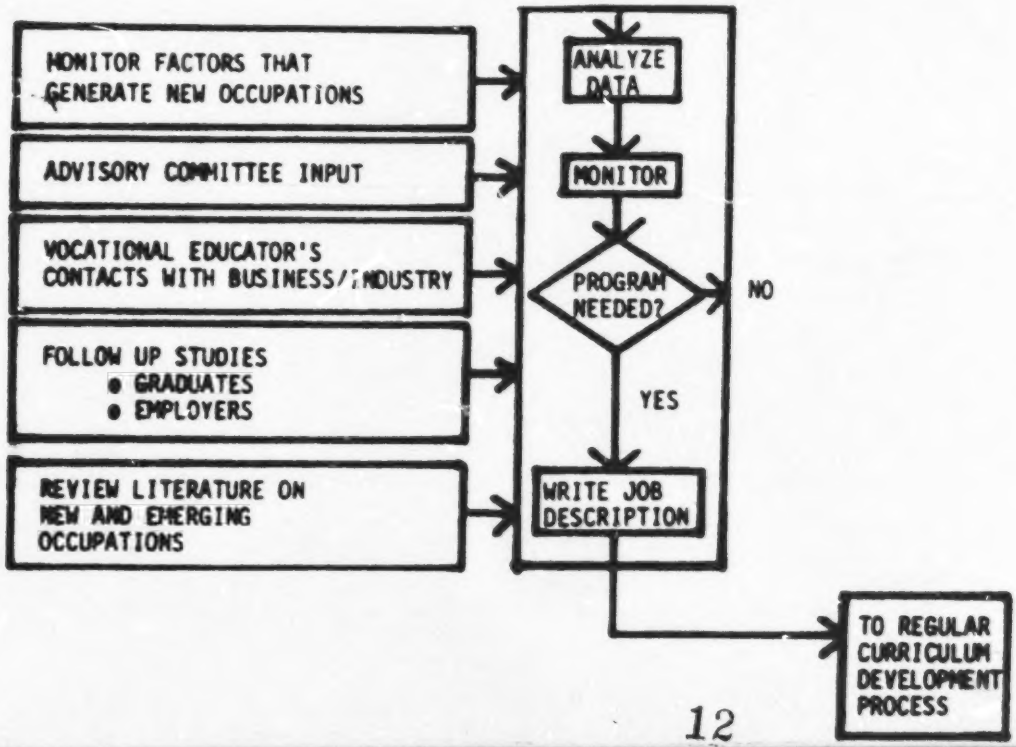
The identification of new and emerging occupations requires a flexible and multifacited approach. It is not a step-by-step process, rather all ways of identifying new and emerging occupations must be investigated and all information assimilated.

The key, however, to identifying new and emerging occupations is to establish a data-gathering network of communication among individuals/ organizations representing all indices of change.

The process for identifying new and emerging occupations is depicted in the following figure and broken down in the succeeding pages. This process basically involves the following:

1) Identify "new and emerging" occupations early;
2) Begin preliminary planning immediately;
3) Constantly monitor the occupation so that commitment of resources is timed with increasing demand for the occupation.

This process can also be used to identify expanding occupations for which demand is increasing.



## CONTINUOUSLY MONITOR THE FACTORS THAT GENERATE NEW OCCUPATIONS

What are the factors that generate new occupations?

The ability to keep abreast of the factors that generate new occupations is paramount to identifying new and emerging occupations. The following factors singularly and in combination affect the emergence of new occupations:

1. Demographic, societal, and environmental changes;
2. Technological changes and advancements;
3. New legislation and government funding.

How will these factors affect the emergence of new occupations?

1. Demographic, societal, and environmental changes

   * Americans are growing older
     - The demand for health care services should increase.
     - Increased leisure time caused by retirement should create demand in the services industry -- banking and tourism should grow.
     - A decline in the growth rate will create a sharp decline in education, home building, and the military which depend on youth.

   * More women are working
     - The demand for increased services such as child care should continue to grow.

   * Fewer children are being born
     - Labor shortages should occur

   * The use of natural resources is doubling every 14 years in the United States. (The most critical materials will be gone in 100 years or less if we continue the present rate of consumption.)
     - New technologies will need to be developed to better utilize and conserve our existing natural resources. Critical areas to watch are energy, water conservation, trees, and food.

2. Technological changes and trends

   * New technologies often create the following:

- New industries
- New production processes
- Changes in marketing and distribution
- Changes in old industries
- Job restructuring

Keep abreast of new technologies in the following areas:

* Energy and energy related fields
  - Look for developments in synthetic fuels. A recent Department of Labor study found that designing and building synthetic fuel plants will require approximately 85,000 people. Areas affected will include the following:
    - Engineering and construction firms who will build the plants.
    - Companies that produce components such as pipe, heat exchanges, and pressure vessels needed for each plant.
    - Mining and earth moving equipment manufacturers.
    - Conventional oil and gas drilling contractors.
  - Watch for growth and technological developments in non-fossil energy industries such as solar, biomass, wind, geothermal, and nuclear energy.

* Medical and health fields
  - Watch for developments in biomedical equipment technology, electromechanical technology, laser and electro-optical technology, and nuclear medicine technology.
  - Watch for growth in the out-of-hospital care fields -- ambulatory or primary care brought about by rising hospital costs.

* Transportation
  - Dwindling energy supplies will force the transportation industry to seek other ways of transporting people. Look for developments in the following areas.
    - Mass transit
    - Electric cars

* Electronics industry
  - Watch for new developments in the following areas:
    - Semiconductors
    - Computers and computer applications
    - Instruments that test and measure

3. New laws/regulations and/or government funding

New laws and/or government funding can quickly create new jobs. New laws or regulations create a need for individuals to regulate the laws. Additionally, individuals are needed to report compliance of the laws. Government funding creates interest in developing new technologies.

Keep abreast of regulatory policy and/or government funding in the following areas.

- Transportation
- Safety and health
- Environmental protection
- Energy conservation and production
- Rights of individuals in institutions
- Defense

Where can information on these factors be found?

The following sources should be used regularly to provide information on employment trends, government legislation and funding, technological breakthroughs, new jobs, and social, environmental, and demographic trends starting to emerge.

* Newspapers
  - Watch the want ad section for clues on new job titles starting to emerge.
  - Consult the stock market and business sections to find out about what industries/companies are growing, new technological developments, etc.

Magazines, newsletters, and trade and professional journals

- Subscribe to and peruse through trade and professional journals, government publications, and union and industrial newsletters to keep abreast of what is happening.

SOLICIT ADVISORY COMMITTEE INPUT

What is an occupational advisory committee?

A committee consisting of local business people, educators, and interested parents and students. Its purpose is to assist and advise the school on matters pertaining to the instructional program.

What information can an advisory committee provide about new and emerging occupations?

Local advisory committees are one of the best sources of information on new and emerging occupations. Advisory committee members should be asked on a regular basis to help provide the following information:

* Identify current and emerging occupations.
* Interpret the impact of new developments in business and industry.
* Identify political, social, and economic trends which might impact on the emergence of a new occupation.
* Assist in securing subscriptions to industrial magazines and membership in industrial organizations.
* Assist in planning and organizing community surveys.

Once a new and emerging occupation has been identified, advisory committees can do the following:

* Review and/or identify the tasks and duties of an occupation.
* Review and/or identify the knowledges, skills, and attitudes needed in the occupation.

How do you organize and operate an advisory committee?

* Assess the school's past and present experience with advisory committees.
* Prepare a charter to include a written rationale for having the advisory committee and procedures to be followed.
* Obtain official permission to organize from the Board of Education.
* Nominate and notify members.

Once the advisory committee is operating:

* Develop rules for operating the committee.
* Elect officers.
* Explain goals of the advisory committee.
* Identify goals and objectives to be achieved.
* Determine long-range employment trends if possible.
* Assist in identifying anticipated technological changes.
* Identify areas of concern and make recommendations.

VOCATIONAL EDUCATOR'S CONTACT WITH BUSINESS/INDUSTRY

What can vocational educator's do to help identify new occupations?

Vocational educators can provide critical data for the monitoring process. Each vocational educator should be encouraged to do the following:

* Maintain liaison with local business, industry, and union representatives on a regular basis.
* If possible, make industrial visitations to ascertain current employment vacancies, projected replacement needs for one, three, and/or five years, and the number of individuals being prepared for occupations through in-plant training.
* Find out about new technology, products, and experimentations with new equipment and materials that might affect the emergence of new occupations.
* Monitor technological, political, economic, and sociological trends starting to emerge.
* Join and become actively involved in professional associations. Vocational conventions can be an excellent source of information on new and emerging occupations.
* Discuss the implications of industrial trends, new products, equipment, and materials discovered with other staff at departmental meetings.
* Watch industries that are growing in the local area.
* Search through school catalogues to find out about new courses being implemented. These new course offerings might be indicative of new occupations.
* Keep in touch with educational publishers to discover new developments in the field.

## USE FOLLOW UP STUDY DATA

### What are follow up studies?

Survey instruments used to determine the effectiveness of instruction, to update existing programs, or to plan new programs. Generally, follow up studies are of two types--graduate and employer follow up studies.

### How to use the information from follow up studies

Graduate follow up studies: Graduates' responses on follow up studies can identify current jobs in which graduates are employed. These jobs might be new and emerging occupations or occupations for which training is needed.

Employer follow up studies: Employers' responses to follow up studies about recent graduates can identify new competencies needed by graduates or new occupations for which training is needed.

REVIEW RECENT LITERATURE ON NEW AND EMERGING OCCUPATIONS

A review of literature on new and emerging occupations suggests the following occupations as possible candidates. Discuss local demand for the following listed occupations with your advisory committee and instructional staff.

Possible new and emerging occupations:

* Biomedical Equipment Technician
* Industrial Hygiene Technologist
* Pediatric Assistant
* Therapeutic Recreation Technician
* Swine Confinement Facility Assistant Manager
* Solar Energy Technician
* Halfway House Resident Manager
* Nuclear Medicine Technologist
* Nursing Home Administrator
* Long Term Care Technician
* Homemaker-Home Health Aide
* Energy Efficiency Technician
* Physical Security Technician
* Nuclear Quality Assurance Inspector

ANALYZE AND MONITOR DATA ON NEW AND EMERGING OCCUPATIONS REGULARLY

As data on technological developments, new legislation, etc. is collected, the following process can be applied:

* Analyze all accumulated data at departmental meetings on a regular basis.
  - Special files could be set up to help monitor the information compiled.
  - Every six months, process the information through a future viewing process such as the Delphi Technique or scenerios of future events to help identify new jobs.

* For any occupation considered to be new and emerging, do the following:
  - Write a brief job description. The job description should be used to help monitor the local labor market. The job description should include the following:
    * Job title(s) commonly used to describe the job.
    * Location and general working conditions.
    * A general statement of the job duties.
    * Typical employees.

* Determine student interest in the occupation.

* Survey the local community.
  - At this point, the local community should be surveyed to determine the short and long-term manpower needs of the new and emerging occupation. Computer surveys are sometimes available through your local school district which provide this information. The following information might be obtained from employers that employ people in the occupation.
    * Number of people currently employed in the occupation, the number currently needed, and the projected number needed in the future.
    * Typical beginning wages and work hours.
    * Constraints or barriers for entry into the occupation, e.g., handicapped or sex barriers.
    * Skill content and minimum requirements needed in the occupation.
    * Other occupations in demand and for which training is needed.
    * Need for additional training for individuals already employed.
    * Recommendations for programs to be expanded, discontinued, or established.

## APPENDIX

### SELECTED STUDIES UTILIZING PROCESSES FOR IDENTIFYING EMERGING SKILLS

*A Feasibility Study for Solar Technology*. Waco, TX: Texas State Technical Institute, April 1978.

**Vocational Field:** Trade and Industrial Education.
**Sample:** Ninety-nine businesses currently involved in the solar industry.
**Procedure Used:** Survey.
**New Skills and Trends Identified:** The potential for job growth in the solar energy field is noted. The areas of computer science, chemistry, mechanical technology, and solar technology are identified as important skill areas.

Arora, Mehar. *Evaluation of Vocational, Technical and Adult Education in Wisconsin: Delphi Conference*. Menomonie, WI: Center for Vocational, Technical and Adult Education, University of Wisconsin-Stout, 1974.

**Vocational Field:** Vocational Education.
**Sample:** Delphi panel members selected from vocational education, business, industry, government, and agriculture.
**Procedure Used:** Delphi process.
**New Skills and Trends Identified:** Predicts a number of trends related to vocational education. The trends toward small cars, home computers, videotaping systems, multiple family dwellings, do-it-yourself repairs, and automated manufacturing are forecast. The importance and impact of each trend for vocational education are also predicted. Specific emerging skills are not predicted because that was not one of the objectives of the study. However, implications for new skills are readily apparent.

Bauer, Dennis. "New Dimensions for Office Reprographics." *Business Education Forum*, November 1975, pp. 16 & 19.

**Vocational Field:** Business Education.
**Sample:** No information.
**Procedure Used:** Logical analysis of trends.
**New Skills and Trends Identified:** New skills identified are related to the operation of offset presses, special and automatic typewriters, copiers, and multiple column layout.

Cannon, Francis R.; Armstrong, Gary; and Armstrong, Ruth. *A Study to Determine the Skills and Knowledges Required for Personnel in Business Data Processing Centers: To Develop a Relevant Curriculum for Secondary Data Processing Programs and for Data Processing Programs in Teacher Education*. Shippensburg, PA: Shippensburg State College, 1978.

**Vocational Field:** Data Processing.
**Sample:** Pennsylvania businesses (1,851 from which 453 usable responses were obtained).
**Procedure Used:** Labor market survey.
**New Skills and Trends Identified:** Primarily identified trends in jobs in the business data processing area. Some skill areas identified for more emphasis are remote key entry of data, systems analysis, programming applications, and communications.

*Changing Workforce Needs With Implications for Higher Education*. Kenosha, WI: Gateway Technical Institute, 1978.

**Vocational Field:** Vocational Education.
**Sample:** Representatives from business, industry, and education.
**Procedure Used:** Symposium.

**New Skills and Trends Identified:** Presenters and discussion groups identified a variety of skills that will take on more importance in the years ahead. Increased involvement of employees in decision making will require more comprehensive knowledge of how business enterprises function and more sophisticated decision-making skills. The growing role of information in business will require improved ability to (1) analyze and use information, (2) solve problems, and (3) communicate the ideas and facts embedded in data. With the increasing rate of change, the capacity to change and adapt will be important.

*Continuation of Futuring the Business Education Curriculum Needs.* New York: Institute for Research and Development in Occupational Education, City University of New York, July 1978.

**Vocational Field:** Business Education.
**Sample:** Panel of experts.
**Procedure Used:** Conference.
**New Skills and Trends Identified:** Six papers on business education and projected job needs are reported. The papers focus on four main topics. Emerging skills are listed: time management, problem solving, operating videotape and playback devices, human relations skills, communications, economics of industrial organizations, and career decision making.

Dale, Dorothy; Klitzke, Elizabeth; Larson, Charlene; and Gertner, Betty. *Third Annual Composite Report for Secondary Vocational Education in Wisconsin: 1979-80.* Menomonie, WI: Center for Vocational, Technical and Adult Education, University of Wisconsin-Stout, 1980.

**Vocational Field:** Vocational Education.
**Sample:** Fifty-six secondary schools in Wisconsin.
**Procedure Used:** Evaluation study.
**New Skills and Trends Identified:** Employer and graduate follow-up data indicated satisfaction with the education and training provided by vocational programs. No specific data were collected on emerging skills. Many employers noted the need for more leadership training. Advisory committee members indicated that they believed they had contributed to curriculum development and the identification of specific tasks.

Elliott, William, "Role and Responsibility of Industry in the Professional Development of Vocational Educators." A paper presented at the 1978 Technical Assistance Conference, April 1978, Columbus, Ohio.

**Vocational Field:** Vocational Education.
**Sample:** No information.
**Procedure Used:** Review of related programs.
**New Skills and Trends Identified:** The need for administrative structures and processes for industry to utilize in educating vocational education teachers is described along with the need for staff development mechanisms to keep pace with changes in technology.

Halverson, Homer, et al. *Job Opportunities Forecast for Washington State, 1974 to 1985.* Olympia WA: Washington State Commission for Vocational Education, 1978.

**Vocational Field:** Vocational Education.
**Sample:** Task force with data inputs from an employment security office, U.S. Bureau of Labor Statistics, and other government departments.
**Procedure Used:** Labor market survey.
**New Skills and Trends Identified:** Findings are listed in terms of job growth and emerging occupations.

Hogue, Ken. *Identification and Analysis of Emerging Occupations in Marketing and Distributive Educational Final Report.* College Station, PA: Texas A&M University, July 1979.

**Vocational Field:** Marketing and Distributive Education.
**Sample:** Businesspersons (397) and distributive education coordinators (318) in Texas.
**Procedure Used:** Special survey: Two survey forms were used to collect job information.
**New Skills and Trends Identified:** Emerging jobs identified included travel agents, foreign exchange clerk, inventory control assistant, and pharmacy sales. A task analysis process was presented for use in identifying specific skills required in these jobs.

*Identification of New and Emerging Careers or Occupations in West Virginia and Determination of the Feasibility of Providing Vocational Education Programs.* Pittsburgh, PA: Associated Educational Consultants, 1979.

**Vocational Field:** Vocational Education.
**Sample:** Two task forces provided input. One was made up of specialists from the employment demand area and the second was composed of persons who had knowledge of vocational education programs.
**Procedure Used:** The task forces and an employer survey were used to provide projections of job openings.
**New Skills and Trends Identified:** The project identified policy issues, projected changes in occupations, and a planning process for new and emerging occupations. Some of the emerging occupations identified were coal conversion technologist, communications specialist, health equipment technician, recreation equipment repair specialist, and solar technician.

Inman, Thomas H., and Van Hook, Barry. "Internal Communication Essential for Effective Organization Management." *Business Education Forum*, February 1981, pp. 19-25.

**Vocational Field:** Business Education.
**Sample:** No information.
**Procedure Used:** Logical analysis of information available in business and industry.
**New Skills and Trends Identified:** The need for new and expanded skills in the areas of communication, leadership, interpersonal relationships, and self-concept is noted.

Johnson, Charles E. *A Comparative Analysis of Three Basic Designs for Competency Validation.* Athens, GA: University of Georgia, January 1977.

**Vocational Field:** Vocational Education.
**Sample:** On-the-job workers.
**Pocedure Used:** Task analysis, product assessment, and logical analysis.
**New Skills and Trends Identified:** The researcher concluded that each process is useful and that in some instances there is value in using the three in combination. Logical analysis was described as the most effective method for identifying changing competencies and those that are based on values, attitudes, and concepts.

Kaufman, Jacob J. *Human Resource Development and Vocational Education.* College Station, PA: Pennsylvania State University, May 1975.

**Vocational Field:** Vocational Education.
**Sample:** No information.
**Procedure Used:** Synthesis of the author's research acitivites in vocational education.
**New Skills and Trends Identified:** The study suggests that new skills workers need to develop include (1) the ability to learn new skills, (2) the capacity to accept more responsibility, (3) flexibility, and (4) improved capacity to make decisions.

Lesch, Gerald. "A Welding Survey of the Blackhawk Technical Institute Industries." Education specialist's thesis, University of Wisconsin-Stout, 1975.

**Vocational Field:** Trade and Industrial Education.
**Sample:** A sample of employers and employees in South Central Wisconsin.
**Procedure Used:** Task analysis with projections for five years.
**New Skills and Trends Identified:** The study reports that the use of several welding processes are predicted to increase, for example, plasma arc cutting and welding.

Maxwell, G.W. "Changes: Will They Never Cease?" *Journal of Business Education*, November 1980, pp. 44-46.

**Vocational Field:** Business Education.
**Sample:** No information.
**Procedure Used:** Logical analysis of current events and data.
**New Skills and Trends Identified:** Changes in population, society, families, and jobs were forecast. The average age of the work force will increase, and more married women will be employed. The trend toward the need for more white collar workers and clerical workers will continue. These changes will have a definite impact on the skills and knowledge needed in business and office jobs. Recommended is more emphasis on work experience, simulation, and gaming.

Maxwell, G.W., and West, Linda. *Handbook for Developing Competency Based Curricula for New and Emerging Occupations.* San Jose, CA: San Jose State University, 1980.

**Vocational Field:** Vocational Education.
**Sample:** An advisory committee comprised of vocational education teachers, coordinators, and administrators and a pilot-test committee that included vocational education teachers from high school and community college districts.
**Procedure Used:** Review of existing systems, interviews, and evaluation by the advisory and pilot-test committees.
**New Skills and Trends Identified:** A handbook was designed to assist vocational educators in preparing competency-based curricula for new and emerging occupations. Techniques for identiyfing new and emerging occupations, conducting task analysis, and developing competency-based curricula are discussed.

Meleen, Paulette, et al. *Identifying and Planning for New and Emerging Occupations: A Suggested Guide.* Belmont, MA: March 1976.

**Vocational Field:** Vocational Education.
**Sample:** National statistics.
**Procedure Used:** Analysis of legislation, technological changes, occupational trends, and societal changes.
**New Skills and Trends Identified:** The project developed a process for reviewing trends and changes in legislation, technology, society, and jobs to identify new and emerging occupations. New and emerging occupations identified in the study are: child advocate, energy efficiency technician, halfway house resident manager, horticultural therapy aide, industrial hygiene technician, nuclear quality assurance inspector, physical security technician, podiatric assistant, crystal manufacturing worker, housing rehabilitation specialist, and public safety communications operator.

Morton, J.B., et al. *Student and Employer Evaluation.* Stillwater, OK: State Department of Vocational, Technical and Adult Education—Research Division, 1977.

**Vocational Field:** Vocational Education.
**Sample:** Graduates (1,215) of secondary vocational and technical programs in Oklahoma and 106 of their employers.

**Procedure Used:** Evaluation survey questionnaire.
**New Skills and Trends Identified:** The relevance of the skills taught in vocational education programs was highly rated by graduates and employers. The knowledge of teachers, quality of equipment, and employer satisfaction with training of the graduates were rated. Graduates did not have an opportunity to identify new or obsolete skills and equipment. Employers were given an opportunity to list reason(s) for dissatisfaction with graduates.

Nelson, Orville. *New and Emerging Occupations: A Process for Monitoring and Identifying the Impacts for Vocational and Technical Education.* Menomonie, WI: Center for Vocational, Technical and Adult Education, University of Wisconsin-Stout, 1980.
**Vocational Field:** Vocational Education.
**Sample:** No information.
**Procedure Used:** Logical analysis of previous research, data, and labor market trends.
**New Skills and Trends Identified:** This study presents a process for identifying new occupations. In order to detect new and emerging occupations, changes and trends in technology, resources, life-styles, demography, and legislation must be continuously monitored. These changes and trends need to be analyzed to determine the implications for new jobs. Techniques used to study the future, such as the Delphi and scenario processes, should be used to forecast trends in technology. Follow-up studies of graduates and their employers may signal emerging needs. The procedure recommended is for vocational educators to gather, analyze, and interpret data; decide if a program is needed; write a job description; develop and validate a job task list; and then add this input to the regular curriculum development process. A lower risk approach is to develop units or courses based on the emerging skill(s) and use them in existing programs.

Norton, Robert E. et al. *The Identification and National Verification of Competencies Important to Secondary and Post-Secondary Administration of Vocational Education Final Report: Development of Competency-Based Instructional Materials for Local Vocational Education Administrators—Part I.* Columbus, OH: The Center for Vocational Education, The Ohio State University, 1977.
**Vocational Field:** Vocational and Technical Education.
**Sample:** Administrators (130)—a stratified national sample of secondary administrators and postsecondary vocational education programs. One hundred and twenty usable instruments were returned.
**Procedure Used:** A review of the literature and an administrative task inventory were completed. A DACUM panel made up of twelve administrators from four states met for three days to analyze vocational education administrator tasks and identify related competencies.
**New Skills and Trends Identified:** Project staff found the DACUM approach to be valuable in identifying a number of tasks that were not found in the literature or identified in the task survey. The report recommended that the DACUM process be used periodically to ensure up-to-date information about tasks.

Reed, Lester W., Jr. *Occupational-Technical Program Need Assessment Model.* Austin, TX: University of Texas, 1979.
**Vocational Field:** Vocational and Technical Education.
**Sample:** Employers, students, and adults.
**Procedure Used:** Employer survey, student survey, and adult survey questionnaires.
**New Skills and Trends Identified:** Needs assessment was utilized for identifying present and projecting future human resources needs. The process, which is based on information theory, is designed to provide information at the program level and

encourages the use of a variety of data. These include: graduate placements, labor market statistics (national, state, and local), potential program enrollees, wage profiles, and cost/benefit ratios.

Smith, Harold T. "The Office of the Future: Impact of Business Education." *Business Education Forum*, March 1981, pp. 37-38..

**Vocational Field:** Business Education.

**Sample:** No information.

**Procedure Used:** Analysis of trends in technology.

**New Skills and Trends Identified:** This study predicts that intelligent machines (for example, computer-controlled robots) will simulate human problem solving in the future, that communications will be substituted for travel, and that secretaries will work at home and send their output via telephone to the office. Occupations will become more knowledge based and workers will need to be able to speak and understand the terminology of the new technologies. They will also need an understanding of how these technologies apply to their jobs.

Sorensen, Robert P. "Perceived Priorities and Achievements of Occupational Advisory Committee Functions in the Wisconsin VTAE System." Doctoral dissertation, University of Wisconsin-Madison, 1974.

**Vocational Field:** Vocational and Technical Education.

**Sample:** State directors, advisory committee members, administrators, and teachers in vocational education.

**Procedure Used:** Q-Sort.

**New Skills and Trends Identified:** Participants in the study identified (1) the determination of program content, (2) the identification of community vocational education needs, and (3) the identification of equipment needs as three of the most important functions of advisory committees. Identification of emerging skills was not listed specifically but was implicit in the high priority tasks.

Stuart, Stephen L. *An Exploratory Study to Analyze New Skill Content in Selected Occupations in Michigan and the Mechanism for Its Translation into Vocational Education Curricula.* Columbus, OH: Battelle Columbus Laboratories, 1972.

**Vocational Field:** Vocational Education.

**Sample:** Advisory committees with representatives from labor, management, and vocational education. Employers were also interviewed.

**Procedure Used:** Advisory committees helped to construct task lists for selected occupations. These tasks were verified through employer interviews. The verified lists were then compared with the competencies developed by vocational education programs related to these areas.

**New Skills and Trends Identified:** The process disclosed programs with varied levels of irrelevant content. Some of these programs were almost completely out of date. For some tasks, the skills developed in the related vocational education program did not meet industry standards. The model presented for identifying emerging skills includes task analyses, employer and graduate feedback, discrepancy analyses contrasting task analysis results with program content, and specification of objectives in behavioral terms.

Van Ausdle, Steven, ed. *Vocational Education's Role in a Changing Economy.* Olympia, WA: Washington Department of Public Instruction and State Board for Community College Education, April 1978.

**Vocational Field:** Vocational and Technical Education.
**Sample:** Symposium of representatives from business, industry, labor, agriculture, government, and education.
**Procedure Used:** Symposium.
**New Skills and Trends Identified:** Economists from education and industry noted the problems in predicting economic trends. If forecasts are to be made, they should be developed frequently. The need to improve productivity and the increasing use of electronics in a variety of jobs were discussed.

Wakin, B. Bertha. "Business Dynamics: A New Direction for a New Decade." *Business Education Forum*, February 1981, pp. 11-12.
**Vocational Field:** Business Education.
**Sample:** Committee of business executives, educators, and national experts.
**Procedure Used:** A comprehensive study of businesses in New York and a symposium in which the results of the study were discussed.
**New Skills and Trends Identified:** The study identified the need for (1) improved decision making, human relations, and problem-solving skills, (2) a more comprehensive knowledge of our economic system, and (3) knowledge of basic computer applications.

Wallbrown, Rodney. "Keeping Up to Date—A Must for Vo-Ag." *The Agricultural Education Magazine*, March 1981, pp. 5-6.
**Vocational Field:** Vocational Agriculture.
**Sample:** No information.
**Procedure Used:** Analysis of changes in agriculture.
**New Skills and Trends Identified:** The need to monitor literature, demonstrations, and applications of new practices, equipment, and genetic techniques is noted in this article.